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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/029,282	12/28/2001	David W. Boertjes	71493-949 / ala	3125

42534 7590 06/01/2005

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EXAMINER
LEUNG, CHRISTINA Y

ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 06/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

OK

Office Action Summary	Application No.	Applicant(s)
	10/029,282	BOERTJES ET AL.
	Examiner	**Art Unit**
	Christina Y. Leung	2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 28 December 2001.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-34 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-27 and 29-34 is/are rejected.

7)☒ Claim(s) 28 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 28 December 2001 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 5-31-02; 11-27-02. and 7-6-04

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the express path (such as directly claimed in claim 6 or indirectly claimed in claim 28, which recites one or more secondary DSCMs in "all but one of the two or more OADM elements") must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3, 4, 7, 12, 13, 15-17, 19, 20-22, 24, 30, 31, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cao (US 6,169,616 B1) in view of Hajjar et al. (US 6,344,912 B1).

Regarding claim 1, Cao discloses a method of implementing programmable optical add/drop multiplexing (Figures 3A, 3B, and 5), the method comprising:

demultiplexing a respective input WDM (wavelength division multiplexed) optical signal into a plurality of optical path signals each comprising at least one channel (using WDM MUX/DEMUX 320 in add/drop module 10; Figure 3B; column 4, lines 16-57);

performing an add/drop function of selected ones of the optical path signals and establishing through paths of remaining ones of the optical path signals (using switch matrix module 30 (column 3, lines 55-67; column 5, lines 39-67; column 6, lines 1-44);

multiplexing, a plurality of optical path signals into an output WDM optical signal (using WDM MUX/DEMUX 320 in the other add/drop module 20); and

performing chromatic dispersion compensation and amplitude compensation wherein a respective at least one of chromatic dispersion and amplitude of the output WDM optical signal is independent of the add/drop function and corresponds to a target value (using dispersion

compensator 310, dispersion compensating fiber 330-1...n, and amplifier 305; Figure 3B; column 4, lines 19-39).

Cao does not specifically disclose demultiplexing and multiplexing a respective WDM optical signal for "each one of N optical systems." However, larger optical networks including multiple WDM signals (each comprising multiple channels) are well known in the art. Furthermore, Hajjar et al. teach a programmable optical add/drop multiplexing method (Figures 1-3) that is related to the one disclosed by Cao, including:

demultiplexing WDM signals into a plurality of path signals each comprising at least one channel (with modules such as "channel filter demux module 220" shown in Figure 2, for example; column 3, lines 33-67);

performing an add/drop function of selected ones of the path signals and establishing through paths of the remaining path signals (using switching fabric 110; column 3, lines 23-58; column 4, lines 10-16; column 7, lines 8-38); and

multiplexing a plurality of path signals into output WDM signals (using modules such as "channel mux module 250" shown in Figure 2, for example; column 4, lines 1-4).

Hajjar et al. particularly teach demultiplexing and multiplexing a respective WDM optical signal for each one of N optical systems by using a plurality of the demultiplexing and multiplexing modules 220 and 250 accordingly.

It would have been obvious to a person of ordinary skill in the art to include more than one input and output WDM signal (and more than one optical system) as taught by Hajjar et al. in the method disclosed by Cao in order to process greater amounts of data on multiple incoming and outgoing fibers/optical systems in a large optical network.

Regarding claim 3, as similarly discussed above with regard to claim 1, Cao discloses a method of implementing programmable optical add/drop multiplexing (Figures 3A, 3B, and 5), the method comprising;

demultiplexing a respective input WDM optical signal into a plurality of optical path signals each comprising at least one channel (using WDM MUX/DEMUX 320 in add/drop module 10; Figure 3B; column 4, lines 16-57);

performing an add/drop function of selected ones of the optical path signals and establishing through paths of remaining ones of the optical path signals (using switch matrix module 30 (column 3, lines 55-67; column 5, lines 39-67; column 6, lines 1-44);

multiplexing a plurality of optical path signals into an output WDM optical signal (using WDM MUX/DEMUX 320 in the other add/drop module 20); and

establishing at least two paths of approximately equal optical path lengths between the demultiplexing and the multiplexing (Figures 3A, 3B, and 5 show at least two such paths with equivalent elements in the paths).

Again, Cao does not specifically disclose demultiplexing and multiplexing a respective WDM optical signal for "each one of N optical systems." However, larger optical networks including multiple WDM signals (each comprising multiple channels) are well known in the art. Furthermore, Hajjar et al. teach a programmable optical add/drop multiplexing method (Figures 1-3) that is related to the one disclosed by Cao, including demultiplexing WDM signals, performing an add/drop function, and multiplexing channels into output WDM signals. Hajjar et al. particularly teach demultiplexing and multiplexing a respective WDM optical signal for each

one of N optical systems by using a plurality of the demultiplexing and multiplexing modules 220 and 250 accordingly.

It would have been obvious to a person of ordinary skill in the art to include more than one input and output WDM signal (and more than one optical system) as taught by Hajjar et al. in the method disclosed by Cao in order to process greater amounts of data on multiple incoming and outgoing fibers/optical systems in a large optical network.

Regarding claim 4, Cao discloses that the at least two paths of approximately equal optical path lengths are established by providing equivalent functional elements in the at least two paths of approximately equal optical path lengths (see paths shown in Figures 3A, 3B, and 5).

Regarding claim 7, Cao discloses performing chromatic dispersion compensation (using dispersion compensator (using dispersion compensator 310 and dispersion compensating fibers 330-1...n), wherein the output WDM optical signal of the optical system, the chromatic dispersion corresponds to a target value which is suitable for transmission requirements of a respective optical system and wherein the target value is independent of the add/drop function (column 4 lines 26-45; column 5, lines 14-23).

Regarding claim 12, Cao discloses performing amplitude compensation (using amplifier 305 and variable attenuators 335-1...n), wherein for the output WDM optical signal of the optical system, the power corresponds to target values which are suitable for transmission requirements of a respective optical system and independent of the add/drop function (column 4, lines 16-25; column 5, lines 24-37).

Regarding claim 15, Cao discloses that the performing amplitude compensation comprises performing amplitude compensation of at least one of the optical path signals of the optical system (using variable attenuators 335-1...n), wherein for respective ones of the optical path signals of the optical system, the power is set to a specific common value (column 5, lines 24-37).

Regarding claim 16, Cao discloses that each one of a plurality of paths between the de-multiplexing and the multiplexing is established in a manner that the plurality of paths have equal optical path lengths (Figures 3A, 3B, and 5 show that the paths include the same elements and have equal optical path lengths).

Regarding claim 17, as similarly discussed above with regard to claim 1, Cao discloses a programmable optical add/drop multiplexer (OADM) comprising:

an OADM element (including module 10 and module 20 shown in Figure 3A) comprising a demultiplexer (DeMUX) and a multiplexer (MUX) connected through a plurality of paths, wherein the DeMUX is adapted to demultiplex an input WDM optical signal into a plurality of optical path signals each propagating through a respective one of the paths, and wherein the MUX is adapted to multiplex a plurality of optical path signals into an output WDM optical signal (see Figure 3B; one WDM MUX/DEMUX element 320 is located in module 10 and another MUX/DEMUX 320 is located in module 20; column 4, lines 16-57); and

a plurality of switches 505 (Figure 5) each connected to respective ones of the paths of the OADM element, wherein the switches are adapted to perform an add/drop function of selected ones of the optical path signals of the OADM element and establish through paths of

remaining ones of the optical path signals of the OADM element (column 3, lines 55-67; column 5, lines 39-67; column 6, lines 1-44).

Cao further discloses a plurality of variable gain control elements (variable attenuators 335-1...n) adapted to perform amplitude compensation in a manner that the amplitude of the output WDM optical signal is independent of the state of the switches (column 5, lines 25-38).

Again, Cao does not specifically disclose two or more OADM elements each comprising a demultiplexer and a multiplexer. However, larger optical networks including multiple WDM signals (each comprising multiple channels) are well known in the art. Furthermore, Hajjar et al. teach a programmable optical add/drop multiplexing system (Figures 1-3) that is related to the one disclosed by Cao as already discussed above with regard to claim 1. Hajjar et al. particularly teach multiple OADM elements each comprising a demultiplexer and a multiplexer, since they teach demultiplexing and multiplexing a respective WDM optical signal for each one of N optical systems by using a plurality of demultiplexing and multiplexing modules 220 and 250 accordingly.

It would have been obvious to a person of ordinary skill in the art to include more than one OADM element as taught by Hajjar et al. in the method disclosed by Cao in order to process greater amounts of data on multiple incoming and outgoing fibers/optical systems in a large optical network.

Regarding claim 19, as similarly discussed above with regard to claim 17, Cao discloses a programmable OADM comprising:

an OADM element (including module 10 and module 20 shown in Figure 3A) comprising a demultiplexer (DeMUX) and a multiplexer (MUX) connected through a plurality of

paths, wherein the DeMUX is adapted to demultiplex an input WDM optical signal into a plurality of optical path signals each propagating through a respective one of the paths, and wherein the MUX is adapted to multiplex a plurality of optical path signals into an output WDM optical signal (see Figure 3B; one WDM MUX/DEMUX element 320 is located in module 10 and another MUX/DEMUX 320 is located in module 20; column 4, lines 16-57); and

a plurality of switches 505 (Figure 5) each connected to respective ones of the paths of the OADM element, wherein the switches are adapted to perform an add/drop function of selected ones of the optical path signals of the OADM element and establish through paths of remaining ones of the optical path signals of the OADM element (column 3, lines 55-67; column 5, lines 39-67; column 6, lines 1-44).

Cao further discloses optical path length means for reducing effects of coherent cross-talk between the optical path signals (Figures 3A, 3B, and 5 show at least two such paths of approximately equal optical path lengths between the demultiplexing and the multiplexing with equivalent elements in the paths).

Again, Cao does not specifically disclose two or more OADM elements each comprising a demultiplexer and a multiplexer. However, larger optical networks including multiple WDM signals (each comprising multiple channels) are well known in the art. Furthermore, Hajjar et al. teach a programmable optical add/drop multiplexing system (Figures 1-3) that is related to the one disclosed by Cao as already discussed above with regard to claim 1. Hajjar et al. particularly teach multiple OADM elements each comprising a demultiplexer and a multiplexer, since they teach demultiplexing and multiplexing a respective WDM optical signal for each one of N

optical systems by using a plurality of demultiplexing and multiplexing modules 220 and 250 accordingly.

It would have been obvious to a person of ordinary skill in the art to include more than one OADM element as taught by Hajjar et al. in the method disclosed by Cao in order to process greater amounts of data on multiple incoming and outgoing fibers/optical systems in a large optical network.

Regarding claims 20, 21, and 22, Cao discloses that the optical path length means for reducing effects of coherent cross-talk comprises each one of the paths (which is at least two) having approximately the same optical path length, wherein functional elements within any one of the at least two of the paths are equivalent to other functional elements within any other one of the at least two paths. Figures 3A, 3B, and 5 show paths of approximately equal optical path lengths between the demultiplexing and the multiplexing with equivalent elements in the paths.

Regarding claim 24, Cao discloses means for chromatic dispersion compensation connected (dispersion compensator 310 and dispersion compensating fibers 330-1...n), wherein the chromatic dispersion of the output WDM signal corresponds to a respective target value and is independent of the state of the switches (column 4 lines 26-45; column 5, lines 14-23).

Regarding claim 30, Cao discloses means for amplitude compensation (amplifier 305 and variable attenuators 335-1...n), wherein the power of the output WDM signal of the OADM element is independent of the state of the switches (column 4, lines 16-25; column 5, lines 24-37).

Regarding claim 33, Cao discloses that the means for amplitude compensation comprises a plurality of VGCEs (variable attenuators 335-1...n) each connected through a respective one of

the paths of the OADM element, each one of the VGCEs being adapted to perform amplitude compensation of a respective one of the optical path signals, wherein the powers of the respective ones of the optical path signals are set to a common value (column 5, lines 24-37).

Regarding claims 13 and 31, Cao discloses the performing amplitude compensation comprises performing amplification of the input WDM optical signal of the optical system (using an input amplifier 305 connected to DeMUX 320 as shown in Figure 3B), and therefore, the method and system described by Cao in view of Hajjar et al. includes amplifying each one of the input WDM signals of N optical systems. However, Cao in view of Hajjar et al. do not specifically disclose or suggest that the power of the input WDM optical signals of the optical system is set to a common value. However, it would be well understood in the art that the optimal target values of power may be the same for the WDM optical signals. Regarding claims 13 and 31, it would have been obvious to a person of ordinary skill in the art to have common values of power in the method and system described by Cao in view of Hajar et al. in order to more conveniently design and provide the amplitude compensation (since each signal would not have to be adjusted to a different target value).

4. Claims 2 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hajjar et al. in view of Ishikawa et al. (US 5,602,666 A).

Regarding claim 2, Hajjar et al. disclose a method of implementing programmable optical add/drop multiplexing of N input WDM optical signals in an optical system (Figures 1-3), the method comprising:

demultiplexing each one of the N input WDM optical signals into a plurality of optical path signals each comprising at least one channel (with modules such as “channel filter demux module 220” shown in Figure 2, for example; column 3, lines 33-67),

performing an add/drop function of selected ones of the optical path signals and establishing through paths of remaining ones of the optical path signals (using switching fabric 110; column 3, lines 23-58; column 4, lines 10-16; column 7, lines 8-38); and

multiplexing respective ones of the optical path signals into N output WDM optical signals after the performing an add/drop function and the establishing through paths (with modules such as “channel mux module 250” shown in Figure 2, for example; column 4, lines 1-4).

Hajjar et al. do not specifically disclose introducing one or more dead-bands in each one of the input WDM optical signals, wherein one or more of the dead-bands are between two or more of the plurality of optical path signals.

However, Ishikawa et al. teach a related optical communication system including transmitting a wavelength division multiplexed signal with a plurality of channels, and they further teach dead-bands in between two or more of those channels (Figures 2 and 5; column 4, lines 35-67; column 5, lines 1-35; column 16, lines 63-67; column 17, lines 1-23). It would have been obvious to a person of ordinary skill in the art to provide dead bands as suggested by Ishikawa et al. in the WDM signals of the method disclosed by Hajjar et al. in order to advantageously suppress cross-talk (see Ishikawa et al., column 5, lines 35-65, for example) and thereby more effectively transmit the signals through the network.

Regarding claim 18, as similarly discussed above with regard to claim 2, Hajjar et al. disclose an optical system (Figures 1-3) comprising:

a programmable optical add/drop multiplexer (OADM) comprising:

two or more OADM elements wherein each one of the OADM elements comprises a DeMUX and a MUX connected through a plurality of paths, wherein the DeMUX (channel filter demux module 220) is adapted to demultiplex an input WDM optical signal into a plurality of optical path signals, each one of the optical path signals propagating through a respective one of the paths, and wherein the MUX (channel mux module 250) is adapted to multiplex a plurality of optical path signals into an output WDM optical signal (column 3, lines 33-67); and

a plurality of switches (in switching fabric 110) each connected to respective ones of the paths of the two or more OADM elements, wherein the switches are adapted to perform an add/drop function of selected ones of the optical path signals of the two or more OADM elements and establish through paths of remaining ones of the optical path signals of the two or more OADM elements (column 3, lines 23-58; column 4, lines 10-16; column 7, lines 8-38).

Although Hajjar et al. explicitly show only one demux module 220 and one mux module 250 in Figure 2, Hajjar et al. disclose that multiple demux and mux modules are placed in module slots 121-127 in their system as desired (column 3, lines 44-67; column 4, lines 1-4; column 7, lines 7-38). Hajjar et al. therefore disclose "two or more OADM elements" each including a demultiplexer and multiplexer.

Although Hajjar et al. generally disclose generating the optical signals that are processed through the OADM, they do not specifically disclose a transmitter adapted to generate optical

signals each comprising one or more channel wherein channel frequencies at which the optical signals are generated are limited to provide dead-bands.

However, again Ishikawa et al. teach a related optical communication system including transmitting a wavelength division multiplexed signal with a plurality of channels, and they further teach dead-bands in between two or more of those channels (Figures 2 and 5; column 4, lines 35-67; column 5, lines 1-35; column 16, lines 63-67; column 17, lines 1-23). It would have been obvious to a person of ordinary skill in the art to provide dead bands as suggested by Ishikawa et al. in the WDM signals of the system disclosed by Hajjar et al. in order to advantageously suppress cross-talk (see Ishikawa et al., column 5, lines 35-65, for example) and thereby more effectively transmit the signals through the network.

5. Claims 5 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cao in view of Hajjar et al. as applied to claims 3 and 19, respectively, above, and further in view of Ishikawa et al.

Regarding claims 5 and 23, Cao in view of Hajjar et al. describe a method and system as discussed above with regard to claims 3 and 19, respectively, including WDM signals, but they do not specifically disclose or teach dead-bands.

However, as similarly discussed above with regard to claims 2 and 18, Ishikawa et al. teach a related optical communication system including transmitting a wavelength division multiplexed signal with a plurality of channels, and they further teach dead-bands in between two or more of those channels (Figures 2 and 5; column 4, lines 35-67; column 5, lines 1-35; column 16, lines 63-67; column 17, lines 1-23). Regarding claims 5 and 23, it would have been obvious to a person of ordinary skill in the art to provide dead bands as suggested by Ishikawa et

al. in the WDM signals of the method and system described by Cao in view of Hajjar et al. in order to advantageously suppress cross-talk (see Ishikawa et al., column 5, lines 35-65, for example) and thereby more effectively transmit the signals through the network.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cao in view of Hajjar as applied to claim 3 above, and further in view of Liu (US 6,519,060 B1).

Regarding claim 6, Cao in view of Hajjar et al. describe a method as discussed above with regard to claim 3, including through paths but they do not specifically suggest an express path. However, Liu teach a method related to the one described by Cao in view of Hajjar et al. including implementing optical add/drop multiplexing (Figure 4), and Liu further teaches providing express paths ("express lanes" shown in Figure 4; column 7, lines 38-43). It would have been obvious to a person of ordinary skill in the art to provide an express path as taught by Liu in the method described by Cao and Hajjar et al. in order to allow signals not requiring adding or dropping to pass through fewer elements and thereby transmit those signals more efficiently.

7. Claims 8-11, 14, 25-27, 29, and 32 arerejected under 35 U.S.C. 103(a) as being unpatentable over Cao in view of Hajjar et al. as variously applied to claims 7, 12, 24, and 30 above, and further in view of Roorda (US 2002/0186432 A1)

Regarding claims 8-11, Cao in view of Hajjar et al. describe a method as discussed above with regard to claim 7. Regarding claims 25-27 and 29, Cao in view of Hajjar et al. describe a system as discussed above with regard to claim 24. Regarding claim 14, Cao in view of Hajjar et al. describe a method as discussed above with regard to claim 12. Regarding claim 32, Cao in view of Hajjar describe a system as discussed above with regard to claim 30.

Regarding claims 8 and 25, Cao discloses that the means for performing chromatic dispersion compensation comprises performing preliminary chromatic dispersion compensation of the input WDM optical signal (with a primary compensator 310 connected to a demux 320 as shown in Figure 3B). Cao in view of Hajjar et al. do not specifically disclose or suggest performing slope of dispersion compensation.

However, Roorda et al. teach an optical communication method that is related to the one disclosed by Cao in view of Hajjar et al., including performing chromatic dispersion compensation on a WDM signal (Figures 4 and 6A; page 4, paragraph [0065]; pages 5 and 6, paragraphs [0082]-[0086]). Roorda et al. further teach including slope of dispersion compensation in addition to chromatic dispersion compensation with a dispersion and slope of dispersion compensator (page 8, paragraphs [0123]-[0127]).

Regarding claims 8 and 25, it would have been obvious to a person of ordinary skill in the art to include slope of dispersion compensation as taught by Roorda et al. with the chromatic dispersion compensation in the system described by Cao in view of Hajjar et al. in order to more completely compensate effects of dispersion in the signals and thereby more effectively receive the signals with less distortion/interference.

Cao in view of Hajjar et al. and Roorda et al. also do not specifically disclose or suggest that the input WDM optical signals are set to have common values of chromatic dispersion and slope of dispersion, but it would be well understood in the art that the optimal target values of chromatic dispersion and slope of dispersion may be the same for the WDM optical signals. Further regarding claims 8 and 25, it would have been obvious to a person of ordinary skill in the art to have common values of chromatic dispersion and slope of dispersion in the method

described by Cao in view of Hajar et al. and Roorda et al. in order to more conveniently provide the compensation (since each signal would not have to be adjusted to a different target value).

Regarding claims 10, 11, and 29, Cao discloses that the performing chromatic dispersion compensation comprises performing secondary chromatic dispersion for the optical path signals of the optical system (with secondary compensators 330-1...n connected through the paths as shown in Figure 3B). Cao in view of Hajjar et al. do not specifically disclose or suggest performing slope of dispersion compensation.

However, Roorda et al. teach an optical communication method that is related to the one disclosed by Cao in view of Hajjar et al., including performing chromatic dispersion compensation on a WDM signal (Figures 4 and 6A; page 4, paragraph [0065]; pages 5 and 6, paragraphs [0082]-[0086]). Roorda et al. further teach including slope of dispersion compensation in addition to chromatic dispersion compensation with a dispersion and slope of dispersion compensator (page 8, paragraphs [0123]-[0127]).

Regarding claims 10, 11, and 29, it would have been obvious to a person of ordinary skill in the art to include slope of dispersion compensation as taught by Roorda et al. with the chromatic dispersion compensation in the system described by Cao in view of Hajjar et al. in order to more completely compensate effects of dispersion in the signals and thereby more effectively receive the signals with less distortion/interference.

Cao in view of Hajjar et al. and Roorda et al. also do not specifically disclose or suggest that the optical path signals of the optical systems are set to have common values of chromatic dispersion and slope of dispersion, but it would be well understood in the art that the optimal target values of chromatic dispersion and slope of dispersion may be the same for the WDM

optical signals. Further regarding claims 10, 11, and 29, it would have been obvious to a person of ordinary skill in the art to have common values of chromatic dispersion and slope of dispersion in the method described by Cao in view of Hajar et al. and Roorda et al. in order to more conveniently design and provide the compensation (since each signal would not have to be adjusted to a different target value).

Regarding claims 9, 26, and 27, Cao does not specifically disclose performing output chromatic dispersion compensation and slope of dispersion compensation with an output DSCM connected to a MUX. However, Cao already discloses compensating for dispersion in the optical communication system, and Roorda et al. further teach that elements for dispersion compensation as well as slope of dispersion compensation may be provided in various places in an optical communication system, including at output WDM signals (Roorda et al. teach "post compensation" and also teach generally providing compensators on the WDM paths between add/drop nodes, which would be output compensation corresponding to a nearby node; pages 7-8, paragraphs [0110]-[0114] and paragraphs [0127]-[0128]).

Again, it would have been obvious to a person of ordinary skill in the art to include slope of dispersion compensation as taught by Roorda et al. with the chromatic dispersion compensation in the system described by Cao in view of Hajjar et al. in order to more completely compensate effects of dispersion in the signals and thereby more effectively receive the signals with less distortion/interference. It also would have been obvious to a person of ordinary skill in the art to include output compensation as taught by Roorda et al in the in the system described by Cao in view of Hajjar et al. in order to more completely compensate effects of dispersion in the signals since output compensation would compensate any additional dispersion experienced in

the add/drop system itself after the input and path dispersion compensation already disclosed by Cao.

Regarding claims 14 and 32, Cao does not specifically disclose performing output amplitude compensation with an output amplifier connected to a MUX. However, Cao already discloses amplitude compensation in the optical communication system, and Roorda et al. further teach that elements for amplitude compensation may be provided in various places in an optical communication system, including at output WDM signals (Roorda et al. teach post amplifiers and also teach generally providing amplifiers on the WDM paths between add/drop nodes, which would be output amplitude compensation corresponding to a nearby node; Figures 6A-D; pages 5-6, paragraphs [0082]-[0087]).

It would have been obvious to a person of ordinary skill in the art to include output amplitude compensation as taught by Roorda et al in the in the system described by Cao in view of Hajjar et al. in order to more accurately maintain the signals at desired target values since output compensation would compensate any additional power loss experienced in the add/drop system itself after the input and path amplitude compensation already disclosed by Cao.

8. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cao in view of Hajjar et al. as applied to claim 33 above, and further in view of Takatsu et al. (US 6,441,955 B1).

Regarding claim 34, Cao in view of Hajjar et al. describe a system as discussed above with regard to claim 33, including a plurality of variable gain control elements (variable attenuators 335-1…n), but they do not specifically disclose or suggest that at least one of the VGCEs is adapted to perform a mute function.

However, Takatsu et al. teach an optical communication system (Figure 8) including a WDM signal with a plurality of channels and variable gain control elements (such as variable attenuator 2-1 shown in Figure 8) for controlling the power of each channel. They further teach that the variable gain control element are adapted to mute a particular optical channel (column 13, lines 27-67; column 14, lines 1-7).

It would have been obvious to a person of ordinary skill in the art to provide a mute function as suggested by Takatsu et al. in the VGCEs already disclosed by Cao in the system described by Cao in view of Hajjar et al., in order to shut down a particular channel if errors are detected on the channel so that erroneous signals are not received.

Allowable Subject Matter

9. Claim 28 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:

The prior art, including Cao, Hajjar et al., and Roorda et al., does not specifically disclose or fairly suggest a programmable OADM including all the limitations and elements recited in claim 28 (and including the limitations of claims 19 and 24 on which claim 28 depends), particularly including one or more secondary DSCMs each connected through a respective one of paths of all but one of the two or more OADM elements, wherein each one of the secondary DSCMs is adapted to perform secondary chromatic dispersion compensation of a respective one of the optical path signals, wherein the chromatic dispersion of the respective one of the optical

path signals is set to a value which is equal to a value of chromatic dispersion of a respective optical path signal of a remaining one of the two or more OADM elements.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Y. Leung whose telephone number is 571-272-3023. The examiner can normally be reached on Monday to Friday, 6:30 to 3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571-272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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